

## FURNITURE GLIDE WITH POLYURETHANE BASE

### Background of the Invention

5           The present invention relates to furniture glides, and more particularly to an improved furniture glide base.

Furniture glides are available in a variety of styles and constructions, but an essential purpose is to provide an upper portion for receiving a furniture leg and a lower portion defining a sliding surface. U.S. Patent Nos.  
10   5,991,974, "Swivelling Furniture Glide", and 6,154,923, "High Hold Furniture Glide", and U.S. Publication US2002/0088082A1 describe glides of the type having a three main components: (1) a ferrule including a bottom wall, an upstanding cylindrical side wall extending from the bottom wall and defining a socket for receiving a furniture leg, and clip means within the socket, for  
15   engaging a received furniture leg, (2) a swivelable glide support shell affixed to the bottom wall of the ferrule, and (3) a glide base affixed to the support shell and defining a substantially flat sliding surface for contacting the floor.

U.S. Patent No. 6,405,982, "Self-Attaching Sliding Support for Articles of Furniture", describes another type of glide that does not have a ferrule or  
20   swivel capability, but rather consists of a generally cup-shaped, unitary body of a resilient element for gripping the legs and an integrated slidable base element for contact with the floor.

In these and other known furniture glides, the sliding surface for contacting the floor is of a material specifically chosen for its relatively high  
25   hardness. Typical base element materials include steel (usually selected for carpeted floors) or hard plastics such as nylon or polyethylene (typically selected for tile floors). These materials should ideally provide durability and easy cleaning of the sliding surface, and easy and quiet sliding of the furniture along the floor, without abrasion or smudging. Although these

materials may perform satisfactorily under new or clean conditions, the presence of dirt and debris on the floor in real operating environments, considerably degrades the performance of furniture glides that utilize these base materials.

5

### **Summary of the Invention**

It is an object of the present invention to provide a furniture glide having a sliding surface that can be used on both carpet and tile floors, and  
10 which maintains for extended periods of use, satisfactory durability and easy cleaning, and easy and quiet sliding along the floor, without abrasion or smudging.

In a general aspect, the invention can be summarized as a furniture glide base having a substantially circular sliding surface that is of  
15 elastomeric material, preferably a thermoplastic urethane such as polyurethane. In one embodiment, the glide base has an annular rim portion extending obliquely upward from the periphery of the circular sliding surface to a first elevation, and a central post extending vertically upward from the center of the base, to a higher elevation. The post can have an upper end  
20 that forms a spherical surface to form part of a swivel joint. In another embodiment, the base has an annular rim portion of the same or different material, extending upward from the periphery of the circular sliding surface, for receiving a furniture leg.

In another aspect, the invention is a furniture glide comprising an  
25 upper portion for receiving a furniture leg and a lower portion defining a smooth sliding surface, wherein the lower portion consists of an elastomeric material.

In yet another aspect, the invention is directed to a glide for a furniture leg, comprising (1) a ferrule including a bottom wall, an upstanding  
30 cylindrical side wall extending from the bottom wall and defining a socket for

receiving a furniture leg, and clip means within the socket, for engaging a received furniture leg, (2) a glide support shell affixed to the bottom wall of the ferrule, and (3) and a glide base affixed to the support shell and defining a substantially flat sliding surface, wherein the sliding surface is an elastomer.

Regardless of the embodiment, the relatively soft sliding surface of elastomeric material according to the invention performs surprisingly well on all floor surfaces. It is believed that as a result of the weight load transferred through the furniture leg causing localized high-pressure contact of dirt and debris, such as sand, glass shards, metal chips and slivers and other hard particles, the softer surface yields to temporarily "absorb" the particles. As an example, when a student sits on a chair having glides according to the invention, the particles under the sliding surface are temporarily absorbed by (i.e., recede into) the base such that when the seated student shifts the chair under a desk or table or the like, the particles trapped in the sliding surface do not interfere with the inherently low-friction interface between the sliding surface and the floor.

This absorption effect not only reduces the deleterious effect on sliding due to the presence of particles between the floor and sliding surface, but by the same mechanism reduces the abrasion and smudging of the floor that can arise as particles are "scraped" across a floor by the movement of furniture such as the shifting of a chair. Similarly, the scraping of the sliding surface by such particles is also reduced, thereby extending the life of what conventional thinking would consider unsuitably soft and vulnerable material for this end use.

Another advantage of the invention, is that when the weight on the base is relieved, the deformations in the base material caused by absorption of the particles are restored, thereby pushing the absorbed particles to the sliding surface where they can be easily cleaned.

Accordingly, it should be evident that the present invention readily achieves the objective of providing a furniture glide having a sliding surface that can be used on both carpet and tile floors, and which maintains for extended periods of use, satisfactory durability and easy cleaning, and easy  
5 and quiet sliding along the floor, without abrasion or smudging.

### **Brief Description of the Drawing**

The preferred embodiments of the invention will be described below  
10 with reference to the accompanying drawings, in which:

Figure 1 is a vertical sectional view through a swivel furniture glide having an elastomeric base according to a first embodiment of the present invention;

Figure 2 is a perspective view of the elastomeric base of the  
15 embodiment of Figure 1;

Figure 3 is a vertical section view through a furniture glide having an elastomeric sliding surface according to a second embodiment of the present invention; and

Figure 4 is a perspective view of the furniture glide of the embodiment  
20 of Figure 3.

Figures 5 and 6 are plan and sectional elevational views, respectively, alternative to the embodiment shown in Figures 1 and 2.

### **Description of the Preferred Embodiments**

25 Figures 1 and 2 illustrate a first embodiment of a glide base according to the invention, in the context of swivel furniture glides such as described in U.S. Patent Nos. 5,991,974, "Swivelling Furniture Glide" and 6,154,923, "High Hold Furniture Glide", and U.S. Publication US2002/0088082A1, the  
30 disclosures of which are hereby incorporated by reference.

A clip and ferrule for receiving a furniture leg, are generally designated by the numerals 10 and 12, respectively. The ferrule 12 has a circular bottom wall 14 and an upstanding cylindrical side wall 16. The upper portion of the side wall preferably angles radially inward to define a circular ferrule opening 18. The ferrule opening 18 is preferably chosen to closely match the outer diameter of the furniture leg (not shown). The bottom wall 14 defines a circular rivet opening 20 coaxial with the ferrule opening 18. The bottom wall 14 of the ferrule 12 is further preferably contoured having a dropped portion adjacent the rivet opening 20.

Clip 10 within the ferrule 12 may take a variety of forms; that depicted in Fig. 1 is formed from a longitudinal resilient metal strip. The clip 10 has a clip base 22 which has a footprint smaller than the ferrule opening 18, and a single pair of oppositely positioned clip arms 24, 26. The clip arms 24, 26 extend generally perpendicularly upward from the clip base 22. The unstressed clip arms 24, 26 define a neutral diameter greater than the diameter 28 of the ferrule opening 18. The arms 24, 26 and base 22 of the clip 10 are resiliently deformable whereby as the clip 10 is inserted base first into the ferrule opening 18, the clip arms 24, 26 deform inwardly to the smaller diameter 28 of the ferrule opening 18. The clip arms 24, 26 return to generally the neutral shape after passage through the ferrule opening 18.

The clip base 22 defines a central clip rivet opening 30. The clip rivet opening 30 is aligned with the ferrule rivet opening 20 when the clip 10 is mounted in the ferrule 12. The clip base 22 further projects downward to form a cylindrical portion having a length equivalent to the depth of the contour of the drop portion of the ferrule 12. The rivet openings 20, 30 are of the same diameter.

A rivet 32 is secured through the clip and ferrule rivet openings 30, 20. The rivet 32 has an expandable head portion 34 and an opposite swivel portion 36. The head portion 34 of the rivet 32 is inserted through the

aligned rivet openings 20, 30 and rounded or peened over to pull the swivel portion 36 against the bottom wall 14 of the ferrule 12. The rivet 32 securely fastens the ferrule 12 and clip 10 together. The clip 10 and ferrule 12, when riveted together, are capable of fully supporting a furniture leg, and therefore  
5 preferably do not require any additional structural elements. The swivel portion 36 of the rivet 32 extends downward from the bottom wall 14 and radially outward to define a convex spherical outer swivel surface and a concentric inner spherical swivel surface.

A shell assembly 38, having an inner shell 40 and an outer shell 42,  
10 slidably engages the outer swivel surface of the rivet 32. The inner shell 40 is generally spherical and defines a circular inner shell opening 44 having a diameter less than the swivel portion 36 of the rivet 32. The inner shell 40 is nested within the outer shell 42. The outer shell 42 has a generally frustoconical shape forming an expanded portion 46 defining an outer edge  
15 and a reduced portion 48. The outer shell 42 defines a circular outer shell opening 50 at the reduced portion 48 having a diameter less than the outer diameter of the inner shell 40. The spherical shape of the inner shell 40 allows for improved swiveling sliding engagement of the inner shell 40 with the outer shell 42.

20 A glide base 52 is mounted to the expanded portion 46 of the outer shell 42. The glide base 52 is preferably molded as a unitary or singular component of elastomeric material that is softer than material conventionally used for this purpose. The base 52 is circular, having an annular rim portion 54 for engagement to the outer shell 42 and an axial elevated central post  
25 portion 56. The glide base 52 is mounted in position by the crimped outer edge of the outer shell 42. The post portion 56 of the glide base 52 defines a generally convex base swivel surface in congruent surface-to-surface contact with the inner swivel surface of the rivet 32. The post portion 56 is dimensioned of a sufficient height to maintain the shell assembly 38 in tight

engagement with the swivel portion 36 of the rivet 32. The swivel portion 36, inner shell 40, outer shell 42 and glide base 52 are preferably dimensioned to allow swiveling motion of the ferrule 12 relative to the base 52 of up to 32.degrees from the vertical. Only the outer shell 42 would be required for  
5 furniture glides 58 that require a smaller degree of swiveling. The glide base 52 is preferably constructed of thermoplastic polyurethane elastomer. The glide base 52 acts a cushion and has a smooth, circular sliding surface 60 for contacting a floor surface.

Figures 3 and 4 illustrate a second embodiment according to the  
10 invention, in the context of a glide such as described in U.S. Patent No. 6,405,982, "Self-Attaching Sliding Support for Articles of Furniture", the disclosure of which is hereby incorporated by reference.

A self-attaching slidable support 110 for an article of furniture includes a first resilient, especially elastomeric, support element 112 and a  
15 second, sliding element 114. Support element 112 includes a relatively thick base portion 116, which serves to cushion the weight of the article to be supported. Molded integrally with base portion 116 of support element 112 is an upstanding concave inwardly extending circumferential rim 118. Rim 118 is generally "C" shaped and serves to engage a leg 120 of the article of  
20 furniture to be supported. As rim 118 is also preferably formed from elastomeric material, it is free to elastically engage the perimeter of leg 120. Furthermore, rim 118 is also capable of accommodating legs of a range of sizes and shapes.

The edge 122 of rim 118 extends inwardly and overhangs the interior  
25 space 124 of support element 112. The diameter of the circular opening 126 of rim 118 is shown as dimension A. However, the diameter of interior space 124 of element 112 is shown as dimension B which is larger than that of dimension A. As rim 118 will elastically deform when leg 120 is inserted therein, support 110 can thus accommodate furniture legs in the diameter

range of A to B. Furthermore, rim 118 will also accommodate square or rectangular legs whose diagonal is within the range A to B. This reduces the number of sizes of supports 110 that needs to be carries in stock. In addition, the generally circular support 110 shown herein could also be oval or rectangular in plan view.

Sliding portion 114 is generally cup shaped and is joined to the underside of support element 112 so that it will rest on the surface on which the article of furniture is to be supported. Sliding portion 114 is preferably fabricated from a thermoplastic polyurethane elastomer

It should be appreciated that the slidable support 110 according to the second embodiment could alternatively be made of a homogeneous elastomeric material, rather than diverse materials. In either variation, the lower portion 114 defining the sliding surface consists of an elastomeric material, including blends of elastomers, whereas the upper support element or portion 112 is not required to be elastomeric. Similarly, the glide base of the first embodiment could be a composite, so long as the sliding surface is elastomeric.

Figures 5 and 6 show an alternative embodiment to that described above with respect to Figures 1 and 2. The overall glide 210 of this embodiment has a clip structure including a ferrule 212 within which is supported a generally circular clip member 214 formed with a plurality of recesses or cut-outs, thereby defining individual, downwardly projecting clip arms 216 for firmly securing the substantially tubular lower end of a furniture leg (not shown). A steel rivet 218 passes centrally through the ferrule 212 and has an upper end that is expanded during assembly to trap the clip 214 against the top of the dome 220 formed in the bottom of the ferrule. The ferrule itself rests on a support platform 222 that is in turn supported at the lower end of the rivet, where the rivet has a concave seat 224. This provides a swivel engagement with the post portion 226 of base 228. As



with the previously described embodiment, preferably, polyurethane base 228 is mounted in position by the crimped outer edges of the cover shell 230, which in turn is mounted over the inner shell 232.

5 The elastomeric material defining the sliding surface of any embodiment of the invention, is preferably a urethane, especially thermoplastic and particularly a polyester polycaprolactone resin. In general, the elastomer should have hardness in the range of 50-60, preferably about 55, on the Shore D scale. The preferred polyurethane material is available as Dow Series 2102 Pellethane TPE.

10 It should also be appreciated that the exclusive rights in the invention are defined by the claims, and are not limited to the preferred embodiments. The elastomeric base or sliding surface according to the invention can be incorporated into other types of swivel glides e.g., such as various combinations of the ferrules, clips, and support shells described in the  
15 patents incorporated herein by reference; glides that do not swivel; temporary glides for moving furniture or the like; and glides that are adapted to fit over original equipment glides, such as described in U.S. Patent No. 6,324,725, "Furniture Glide".